The Begonias are, as is well known, propagated from leaves to a large extent in our greenhouses; the *Hoya carnosa* and the *Acuba japonica* exhibit the same phenomenon.

Buds are formed on the roots of trees, shrubs, and herbaceous plants, which are capable of the direct production of young plants of the same kind as the parent. Every one knows that the gardener avails himself of this familiar fact for the purpose of increasing his stock in a very large number of plants. One point only requires further mention, viz. that the tendency to produce young plants from roots is in some cases produced, and in others is greatly increased by the destruction of the parent plant. This seems to show that the same cells or parts of the plant which, during the continued life of the parent, assisted in its vital functions, have, by reason of its destruction or death, been diverted to new duties. The same part, therefore, is alike adapted to, or at least capable of, nutrition and reproduction.

Buds are formed on and around the underground bulbs of a large number of plants; no mode of reproduction is more familiar to our gardeners.

Buds, again, are produced in some cases on the subterranean stems, as in *Stellaria bulbosa.*

In many cases flowers are replaced by bulbils: *Polygonum viviparum* and *bulbiforum*, *Saxifraga cernua*, *nivalis* and *stellaris*, *Juncus alpinus* and *supinus*, *Aira alpina*, *Festuca alpina* and *rupicaprina*, *Poa alpina* and *conisia* are cases in which perfectly formed flowers are often produced, but in which small bulbils frequently, and especially in alpine or arctic regions, take the place of the flowers. (2 Kerner by Oliver, 454.) These bulbils are detached from the parent plant, and throw roots downwards and stems and foliage upwards. A somewhat analogous growth has been found in the *Nymphæa lotus* var. *monstrosa* (Barber, "On a Change of Flowers to Tubers in *Nymphæa lotus* var. *monstrosa*," *Ann. Bot.* iv. 105). After the development of the sepals, instead of the production of petals and stamens there was formed a bud of green leaves, which developed into a tuber from which a young plant arose. In the persistence of the flower's stalk and sepals, this case differs from that presented by such plants as the *Polygonum viviparum.*

Lastly, one of the most interesting cases of vegetative reproduction is that of parthenogenesis, or the production of seeds by the female plant without the co-operation of pollen. This appears to be established beyond doubt in the case of the *Cœlebogyne ilicifolia*, and probably in the cases of the hemp the *Mercurialis annua* and *Gnaphalium alpinum.* This mode of reproduction strikes the mind as very remarkable, because it shows that even in very highly organised plants parts which had been specially provided for reproduction under the stimulus of the pollen cell, still retain the capacity of reproduction even without that stimulus.

It is obvious from these familiar facts that the capacity of reproduction is retained by a great part of the organism in many plants, and that it is not excluded by the fact that the part in question may be highly and definitely organised for some other purpose than reproduction, or that it may be intended, according to the analogy and the common course of nature, for reproduction only after the stimulus of fertilisation.

Conclusions.

The doctrine (to use an ambiguous word) of the alternation of generations may be regarded in several lights: as a compendious statement of facts; as an analogy; as something to be inferred in ancestral forms from existing ones.

If we mean by a generation the life of an independent organism from the time when its whole future was gathered up in one cell, it seems never to represent the facts of vegetable growth; if by it we mean the dependent life of part of an organism from a single cell, it appears to summarise the facts of the full life-history of ferns and mosses, but not of the Rhizocarps or of Phanerogams.

If we regard the doctrine as an analogy, the points in which the analogy breaks down, and the continued recurrence to exceptions to make it agree with the various facts, seem to rob it of much value.

If the alternation of generations be put before us as a fact which the phenomena of existing vegetable life require us to assume in the past, it seems at least doubtful whether more can be justly said than that amongst many modes of reproduction and many schemes of life-history, an alternation of generations in the sense in which it exists in the mosses and ferns may probably be considered as one; but there seems to be nothing to show that it was ever a dominant scheme of life.

The brief review of familiar facts above given seems to tend towards the following conclusions, which I submit with all deference to those better capable of appreciating the question than I am.

(1) That in the language of Prof. Bower, "no fixed and impenetrable barrier exists between sporophore and oophore," but that, on the contrary, the one is capable of passing over to the other, and that the alternation of generations is not an accurate statement of facts or a useful analogy.

(2) That a truer presentation of the facts is to be found in the statement that fertilisation in a plant does not always result in the direct production of a fertilised ovum capable of producing the cormophyte, as in the Characeæ and the phanerogams, but that it may result in the indirect production of a number of fertilised cells, as in the mosses and some fungi, or, as an alternative view of the same facts, in the direct production of a new part of an existing organism.

(3) That (to repeat the foregoing statement in another form) the different generations in the life-history of any given plant are not separate organisms, but different stages or parts of the same organism.

(4) That when the like events can be found in the life-history of different plants, the order of the succession of events is unstable, and that the first may become last and the last first, according as the physiological circumstances of the plant give scope for the action of that reproductive capacity with which the whole plant seems to be endowed.

(5) That this instability exists, even in the sexual act, as regards its place and time in the order of the succession of events.

(6) That the events which occur in the full life-history of a plant admit of short-circuiting or abbreviation, and that in such abbreviated life-histories the one thing which nature appears to desire to avoid is the sexual act, and that the one thing which it appears to desire to preserve is the cormophyte.

(7) That the passage from the life-history of the moss to that of the fern may be accounted for by a transposition in the order of events, and that by such a transposition a moss may be regarded phylogenetically as the direct ancestor of the filmy fern, and the indirect ancestor of all the other ferns.

(8) That, assuming that there is a germ plasm distinct from somatic plasm, and that the presence of the former is essential for the reproduction of the organism, there is evidence of the wide diffusion of the germ plasm, and that no limit to its presence has yet been ascertained.

(9) And lastly, that the reproductive energy operates in plants in such a variety of ways, and under such varying circumstances, as to make it improbable that the facts of reproduction can, with our present knowledge, be reduced to any one scheme, or referred to any single archetype. Edw. Fry.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

Oxford.—On Tuesday, February 16, Convocation decided to confer by decree the degree of M.A. on Dr. J. S. Haldane, Lecturer in Physiology, and on Dr. W. B. Benham, Aldrichian Demonstrator in Comparative Anatomy.

Messrs. W. W. Fisher (C.C.C.), W. Hatchett-Jackson (Keble), W. S. Church (Ch. Ch.), W. Collier (Exeter), S. H. West (Ch. Ch.), J. E. Marsh (Balliol), and G. W. S. Farmer (Balliol) have been elected members of the Board of the Faculty of Medicine.

The following have been elected Members of the Board of the Faculty of Natural Science:—Messrs. C. Leudesdor (Fellow of Pembroke), D. H. Nagel (Fellow of Trinity), E. H. Hayes (Fellow of New Coll.), J. W. Russell (Merton), J. Walker (Ch. Ch.), F. J. Jervis Smith (Trinity), A. Thomson (Exeter, Professor of Human Anatomy), W. W. Fisher (C.C.C.), and V. H. Veley (University).

On Monday, March 1, Prof. E. E. Barnard exhibited some of his astronomical photographs in the Examination Schools.

Mr. A. C. Le Rossignol (Exeter Coll.) has been elected to an Exhibition in Natural Science at Exeter College on the foundation of King Charles I.

Captain W. de W. Abney, C.B., F.R.S., has accepted the invitation of the Junior Scientific Club to deliver the Robert Boyle Lecture for 1897.

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Scholarships and Exhibitions have been announced for competition as under:—In Natural Science, at Merton, New, and Corpus Christo Colleges, on July 6, 1897; in Mathematics, at Ch. Ch. and Hertford Coll., on June 2, 1897; in Classics, Mathematics, Modern History, or Natural Science, on April 27, 1897.

CAMBRIDGE.—Nine members of the Syndicate on Degrees for Women have reported in favour of granting by diploma the title of B.A. to women who pass a final Tripos examination after residing at Newnham or Girton for nine terms. They propose that the like grant should be made retrospectively to women who have already taken the qualifying examinations, and that after the usual periods the higher titles of M.A., D.Sc., and D.Litt. should be open to the titular B.A. Lastly, they regard it as desirable that women should be made eligible to degrees in Arts, Law, Science, and Music, *honoris causa*. A minority report signed by five members advocates that special titles such as *Magistra in Litteris* (M.Litt) should be devised for duly qualified women, on the ground that these would remove any disability under which Cambridge women students may labour for want of a formal degree, while it would preclude any agitation for full membership of the University, with its concomitants of franchise and governing power. They apparently deprecate, for the same reason, the exclusion of students other than those of Newnham and Girton from participating in the proposed concession. The reports have yet to be discussed by the whole Senate, and it is not improbable that they may be referred back to the Syndicate.

The Special Boards of Studies concerned with the Natural Sciences Tripos propose that candidates in physics and chemistry be allowed to send in, for the inspection of the Examiners, notebooks showing the records of practical work done by them, and bearing the signature of their teacher as a guarantee of their *boná-fides*.

Prof. A. W. Williamson, F.R.S., has been appointed an Elector to the professorship of Chemistry and the Jacksonian professorship of Natural Philosophy; and Mr. M. H. N. Story-Maskelyne, F.R.S., an Elector to the chair of Mineralogy.

According to the lists just issued it appears that while there are only ninety-seven candidates for the Mathematical Tripos (Parts I. and II.), there are 144 for the two parts of the Natural Sciences Tripos in the Easter Term.

BY the will of the late Dr. Robert H. Lamborn, states the *American Anthropologist*, the Academy of Natural Sciences of Philadelphia has been bequeathed his entire estate, aggregating about 40,000*l*., the interest of which is to be used for biological and anthropological research.

BY the will of the late Mr. George Gordon Nicol, states the *British Medical Journal*, important bequests have been left to Aberdeen. Of sundry trust funds, the income on which accrues to his wife during her lifetime, 20,000*l*. are to be in trust for the University of Aberdeen, to found bursaries and scholarships or exhibitions to the English Universities, for Aberdeen students who are natives of Aberdeenshire.

THE following are among recent announcements:—Dr. Edwin Klebs, the well-known German pathologist, appointed to be professor in the Rush Medical College, Chicago, will also occupy a position in the post-graduate medical school of the University of Chicago; Dr. A. C. Abbott, Professor of Hygiene in the University of Pennsylvania, to be chief of the Bacteriological Department of the Philadelphia Health Bureau; Dr. Karl Futterer, Associate Professor of Mineralogy and Geology in the Technical High School at Karlsruhe, to be professor; Dr. Pauly, Associate Professor of Applied Zoology in the University of Munich, to be professor, and also director of the Zoological Department of the Forestry Experimental Station at Munich; Dr. Felix to be professor of anatomy at Zürich; Dr. Karl Kaiser to be professor of physiology at Heidelberg.

ON Friday last, at a meeting of the delegates from institutions named in the report of the Cowper Commission on the University of London, Lord Lister moved the following resolution:—"That this meeting of delegates represents to Her Majesty's Government the great injury caused to the educational interests of the metropolis by the delay in establishing a teaching University for London, and urges upon them the necessity of taking immediate steps for the constitution of a statutory commission for the reconstruction of the University of London on the lines of the recommendations of the Cowper Commission." The motion was seconded by Prof. Rücker and carried unanimously. Lord Lister said that his varied experience had shown him how much more beneficial to the progress of medical science and to the instruction of students the Scottish system of teaching and examination was than the purely examinational system of the University of London. After remarks in support of the resolution by other speakers, Lord Reay said that in no other country in Europe would such a company of distinguished men of science and of learning have urged on its Government the necessity of founding a teaching University without the Government at once acceding to their wishes.

EVERY one interested in educational matters knows that each report of the U.S. Commissioner of Education is a mine of information upon educational progress throughout the world. The seventh of these annual reports, referring to events and developments during the year ending June 30, 1895, has just come to hand. It is in two volumes, each running into about twelve hundred pages. Though largely taken up with information referring to elementary schools, higher education is very fully dealt with, both statistically and from the pedagogical point of view. The movement for the admission of American students to French universities is surveyed. A measure has been secured which enables students from the United States to enter the faculty of sciences in French universities as candidates for the degree of licentiate on the basis of their American diplomas. After the degree has been attained, the doctor's degree may be secured on substantially the same terms as in Germany. An account is given of continuation and trade schools in Germany, especially in Berlin. It shows how the German school authorities endeavour to prepare for skilled labour, and thus increase the productiveness of their sources of wealth. A chapter on the condition of the agricultural and mechanical colleges in the United States, endowed by the national land grants of 1862 and 1890, is preceded by an historical review of early attempts to introduce the subjects of physics, chemistry, manual arts, and agriculture into schools. There is also a chapter on American medical schools. Information on many other educational subjects will be found in the recently-published report.

SCIENTIFIC SERIALS.

Symons's Monthly Meteorological Magazine, February.—Water at unusually low temperatures. On November 30, the observer at Camden Square found that the water supply for the wet bulb thermometer on a Glaisher screen was not frozen, though the air temperature was 29·1°, and that congelation would not take place after stirring the water. The water was afterwards subjected to chemical examination; the somewhat negative character of the results seems to show that the exposure to a smoky atmosphere in the open glass vessel had increased the tendency to resist freezing. In another glass vessel on the same screen, more protected from radiation, but more exposed to the wind, the water was frozen into a solid mass.—An attempt to determine the velocity equivalents of wind-forces estimated by Beaufort's scale, by R. H. Curtis. This is a summary of a paper read before the Royal Meteorological Society on December 16, 1896, a notice of which has already appeared in our columns. In the discussion which followed, the opinion was generally expressed that the publication of velocities obtained by the use of the usual factor 3, which assumes that the cups of the anemometer move with one-third of the wind velocity, should be discontinued, the results being considerably in excess of the true values. The revised factor, as deduced by Mr. Dines and others, is found to be nearer 2·2.—A tornado at Este's Park, Colorado, by H. C. Rogers. The height of the Park is 7500 feet above sea-level. The chief interest in the paper lies in the usual impression that tornadoes are generally restricted to the plains. Information upon this point is desirable, also as to whether they escape notice owing to their force being less, or whether they occur less frequently because the conditions of heat and moisture necessary for their formation do not exist.

Memoirs (*Trudy*) *of the St. Petersburg Society of Naturalists*, vol. xxvi., 1896: Section of Botany.—Can algæ assimilate free nitrogen? by P. S. Kossovich.—It is known that Schloesing and

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